

RALMO Rotational Raman Temperature Retrieval: First Steps Towards The Application of Optimal Estimation Method (OEM).

Temperature is an important atmospheric parameter that plays an extensive role in the fields of atmospheric dynamics, climatology, meteorology, and chemistry. Light detection and ranging (lidar), is a remote sensing technology that can be used for atmospheric temperature profiling. A lidar transmits short laser pulses into the atmosphere. The laser light scattered by the particles in the atmosphere is collected and measured using a telescope. The atmospheric temperatures can be retrieved by analysing the Pure Rotational Raman (PRR) scatter measurements from the nitrogen and oxygen molecules in the atmosphere. The main objective of this study is to use the Optimal Estimation Method (OEM) to retrieve lower atmospheric temperatures from the PRR measurements obtained by the Raman Lidar for Meteorological Observations (RALMO) located in Payerne, Switzerland. The OEM is an inverse method that requires knowledge of a forward model capable of reproducing measurements if the model parameters are, already known. It also can retrieve a full uncertainty budget on a profile-by-profile basis. We propose a forward model to retrieve temperature from PRR measurements using the OEM. The model was tested using synthetic measurements and the results showed that the proposed forward model can be used to retrieve temperatures and few other parameters in the forward model such as lidar constants and background terms. As the next step of my PhD project this method will be used for measurements from the RALMO to retrieve temperature profiles.

Keywords : Pure Rotational Raman , Lidar, Optimal Estimation